DETERMINING WQBELS FROM MERCURY CRITERIA
AND EVALUATING THE CURRENT HG STANDARD (2-3-03)

<u>NON-GLI REGION OF THE STATE</u>

A. Hg Criteria to Effluent Limits

Hg Criteria:

Human Health Organisms	-	0.150 ug/l as acid-soluble
Human Health Water	-	0.140 ug/l as acid-soluble
CCC (chronic std – 4 day average)	-	0.012 ug/l as acid-soluble
CMC (acute std- 1 hour average)	-	2.4 ug/l as acid-soluble

For a low dilution ratio, the chronic criterion (CCC) will determine the effluent limits.

Assume $Q7,10 = 0$ cfs

1. Determine WLAc (Ce) by mass balance

$(1/2Qs) * (Cs) + QeCe = (1/2Qs+Qe)* Cstd$

Where:
Qs = stream Q7,10
Cs = Hg concentration upstream
Qe = effluent flow
Ce = Hg effluent concentration
$Cstd$ = CCC for Hg
WLAc = Wasteload Allocation chronic

2. LTA (Long Term Average) = WLAc * 0.53
    when n = 10 samples/month, CV = default value of 0.6

3. Monthly Average limit = LTA * 1.34
    Daily Max limit   = LTA * 3.11

4. Monthly Average = 0.008 ug/l
    Daily Max   = 0.020 ug/l

However, when n=2[1] , CV = 0.6

2a. LTA (Long Term Average) = WLAc * 0.53

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[1] Since implementation of Method 1631, the renewed City of Valparaiso NPDES Permit requires 2 samples per month (GLI), the new Mirant Sugar Creek PGS NPDES Permit, and the new PSEB Lawerencburg requires 2 samples per month (non-GLI). Based on the IDEM "NPDES Permitting and Mercury" guidance, it seems likely that twice per month sampling may be the maximum required frequency.

3a. Monthly Average limit = LTA * 1.80
     Daily Max limit   = LTA * 3.11

4a. Monthly Average = 0.011 ug/l
     Daily Max   = 0.020 ug/l

Notes:
a.   Beginning January 1, 2004, the water quality standard for Hg shall be applied directly to the undiluted discharge
     for all existing discharges of Hg.
b.   For a new discharge of Hg, the water quality standard for Hg is applied directly to the undiluted discharge.

B. Possible Changes to the Water Quality Standards

The EPA Publication "National Recommended Water Quality Criteria- Correction" (April 1999)
lists Mercury criteria. These criteria are as follows:

CCC	= 0.77 ug/l as dissolved
CMC	= 1.4 ug/l as dissolved
HH fish consumption[2]	= 0.051 ug/l as total
HH fish and water consumption	= 0.050 ug/l as total

If the Indiana adopted these criteria, and assuming the designated use of the water includes fishing and drinking, the
limits calculated for a Q7,10 = 0 cfs stream, and based on Steps 1 through 4 presented above[3], would be:

	10 samples	2 samples
Monthly Average	0.036 ug/l	0.048 ug/l
Daily Max	0.084 ug/l	0.084 ug/l

However, the USEPA issued "National Recommended Water Quality Criteria: 2002" November 2002, which removed
the Human Health (HH) criteria for total mercury and replaced with a criterion for methylmercury as explained:

> "On January 8, 2001, EPA announced the availability of a recommended water quality criterion for
> methylmercury (66 FR 1344). In the January 8, 2001 notice, EPA withdrew its previous ambient
> human health water quality criteria for mercury (see 63 FR 68354, December 10, 1998; correction in
> 64 FR 19781, April 22, 1999) as the recommended section 304(a) water quality criteria. This updated
> compilation contains the new methylmercury criterion. This new water quality criterion describes the
> concentration of methylmercury in freshwater and estuarine fish and shellfish tissue that should not
> be exceeded to protect consumers of fish and shellfish among the general population. EPA expects
> the criterion recommendation to be used as guidance by states, tribes, and EPA in establishing or
> updating water quality standards for waters of the United States and in issuing fish and shellfish
> consumption advisories. This is the first time EPA has issued a water quality criterion expressed as a
> fish and shellfish tissue value rather than as a water column value. This approach is a direct
> consequence of the scientific consensus that consumption of contaminated fish and shellfish is the
> primary human route of exposure to methylmercury. EPA recognizes that this approach differs from

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[2] When Human Health (HH) criterion is to protect for fish consumption only, it is always referred to as the non-
Drinking Water (non-DW) criterion. When the HH criterion is to protect for both fish consumption and drinking water,
the criterion is call a Drinking Water (DW) criterion.
[3] That is a Human Health criterion is translated to a discharge limit just as if it were a CCC. This is the implementation
guidance for non-GLI but is not the implementation regulation for GLI.

traditional water column criteria, and will pose implementation challenges. In the January 8, 2001 notice EPA provided suggested approaches for relating the fish and shellfish tissue criterion to concentrations of methylmercury in the water column. EPA also plans to develop more detailed guidance to assist states and authorized tribes with implementation of the methylmercury criterion in water quality standards and related programs."

The methylmercury criterion is 300 ug/kg and is a fish residue criterion based on a total fish consumption weighted rate of 0.0175 kg/d.

USEPA HQ is drafting "Guidance for Implementing the January 2001 Methylmercury Water Quality Criterion" (as per Inside EPA's "Water Policy Alert", January 27, 2002).

<u>GLI REGION OF THE STATE</u>

A. Hg criteria to Effluent Limits

Hg Criteria:

	<u>Standard</u>	<u>Based on 1/4 Flow</u>
CCC (chronic std – 4 day average)	- 0.772 ug/l as dissolved	Q7,10
CMC (acute std- 1 hour average)	- 1.440 ug/l as dissolved	Q1,10
Human Health DW (30 day)	- 0.0018 ug/l	Harmonic mean
Human Health non-DW (30 day)	- 0.0018 ug/l	Harmonic mean
Wildlife (30 day)	- 0.0013 ug/l	Q90,10

For a low dilution ratio, the Wildlife criteria will usually determine the effluent limits.

1. Determine WLAw (Ce) by mass balance

$(1/4Qs) * (Cs) + QeCe = (1/4Qs+Qe) * Cstd$

Where:
Qs = stream Q90,10
Cs = Hg concentration upstream
Qe = effluent flow
Ce = effluent Hg concentration
Cstd = Wildlife for Hg
WLAw = Wasteload Allocation wildlife

Assume Q90,10 = 0 cfs for the worst case scenario

2. LTA (Long Term Average) = WLAw * 0.78

3. Monthly Average limit = WLAw
    Daily Max limit   = LTA * 3.11

	10 samples	2 samples
Monthly Average	0.0013 ug/l	0.0013 ug/l
Daily Max	0.0032 ug/l	0.0032 ug/l

The wildlife-based limits using IDEM methodology would not be affected by the sampling frequency.

Notes:

Mercury is a BCC

a. Except for specific BCC mixing zone demonstration requirements listed in 327 IAC 5-2-11.4, beginning January 1, 2004, the water quality criteria for a BCC shall be applied directly to the undiluted discharge (i.e., no mixing zone).
b. There shall be no mixing zones available for a new discharge of a BCC.
c. There shall be no mixing zones available for an existing discharge of a BCC into the open waters of Lake Michigan.

B. Possible Changes to the Water Quality Standards

See earlier explanation about USEPA 2002 National Recommended Criteria…